INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

S - E - C - R - E - T

COUNTRY	East Germany/USSR	REPORT	
SUBJECT	Development of an Electrolytic Counter by the VEB EFEM for the USSR	DATE DISTR.	1 February 1956
		NO. OF PAGES	3
DATE OF INFO.		REQUIREMENT NO.	RD
PLACE ACQUIRED		REFERENCES	
DATE ACQUIRED		This is UNEVALUATED Information	

SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

1. An electrolytic counter has been developed at VEB EFEM, (Entwicklung und Fertigung elektrischer Messinstrumente); it is designed to be used in conjunction with ships' switchboards as a check on charge and discharge currents in accumulator batteries. The task, No. K5-05, has been given to VEB EFEM on behalf of the USSR and the East German Sea Police.[1] 25X1

2. VEB EFEM has designed the instrument to conform to the following specifications:

   a. The counter operates on the basis of hydrogen evolution, and its counter tube (Zaehlrohr) is designed for 20 milliampere hours or 150 volt hours. 25X1

   b. Circuit 0.2 milliamperes.

   c. The potential drop of the external resistance may not be less than 1.5 volts. Measurements are accurate to within 2.5 %. 25X1

   d. The instrument operates in a vertical position. Its housing is grounded and sealed for pressure and water tightness; it is secure against corrosion at a depth in water of 10 meters.

   e. The instrument must be capable of withstanding 3 blows delivered vertically in 3 adjacent places, each blow equivalent to a weight of 150 gms. acting under gravity. 25X1

   f. Its design complies with the specifications laid down under DIN (Deutsche-Industrie Norm) 89-001. These specifications concern electrical appliances on sea-going ships.

   g. The instrument complies with the requirements of foreign marine codes, particularly the tenth rule of the Soviet marine code, in order to facilitate its export.

3. The operation of the device is as follows:

S-E-C-R-E-T

22 MAY 1956

STATE	X	ARMY	X	NAVY	Ev X	AIR	X	FBI		AEC		OS I Ev x		

(Note: Washington distribution indicated by "X"; Field distribution by "#".)

INFORMATION REPORT INFORMATION REPORT

25X1

a. The counter is switched in parallel to a temperature-independent indicator in the receiver circuit.

b. The electrolyte consists of 20 % phosphoric acid ($H_3 PO_4$). The electrodes are made of narrow-meshed noble metal covered with rhodium mud (Rhodiummoor).[2] The electrolyte cannot seep into the glass tubes as the pressure it exerts is less than the capillary forces.

c. A potential difference between the electrodes causes the hydrogen ions to travel to the cathode, and the phosphoric acid ions to the anode, each losing its positive or negative charge.

d. The molecules of hydrogen, released from the cathode, go to the available hydrogen.

e. The phosphate radicals recombine with water to form phosphoric acid molecules at the anode. The oxygen molecules so formed combine in a nascent state with hydrogen in the rhodium mud to form water. More hydrogen, available at the anode, then goes into the rhodium mud (Rhodiummoor).

f. In short, the process is that hydrogen is carried from the anode to the cathode. This hydrogen can be measured and indicates the strength of current in the cell, which must be in constant relation to the rated current.[3]

g. The reactions can be represented:

$$4\ H_3 PO_4 \longrightarrow 12\ H^+ + 4\ PO_4^{3-}$$

at cathode $$12\ H^+ \longrightarrow 6\ H_2 + 12\ e^+$$

at anode $$4\ PO_4^{3-} + 6\ H_2O \longrightarrow 4\ H_3 PO_4 + 3\ O_2 + 12e^-$$

$$3\ O_2 + 6\ H_2 \xrightarrow{\text{Rhodium}} 6\ H_2O$$

4. By November 1955, VEB EFEM had made the following progress on the task:

a. Plans had been drawn up, and 2 prototype models produced.

b. 3,350 working hours had been devoted to the project, including:

(1) 2000 hours laboratory development;

(2) 620 hours in the drawing room; and

(3) 730 hours in the workshop.

c. 40,000 DME have been made available for the task.

5. In 1956, designs are to be drawn for a model which can be put into mass production, a prototype instrument of this kind is to be built and tested, and series production is to begin, if present proposals are taken up, at the VEB Geraetewerk Karl-Marx-Stadt.

[redacted] 25X1

Comments:

1. [redacted] in the case of the USSR, the completed instruments will be used mainly in submarines. 25X1

2. [redacted] "Rhodium mud" and the term has been retained, although "porous rhodium" would probably be a better description. 25X1

3. Rated current is the current in the main current. 25X1

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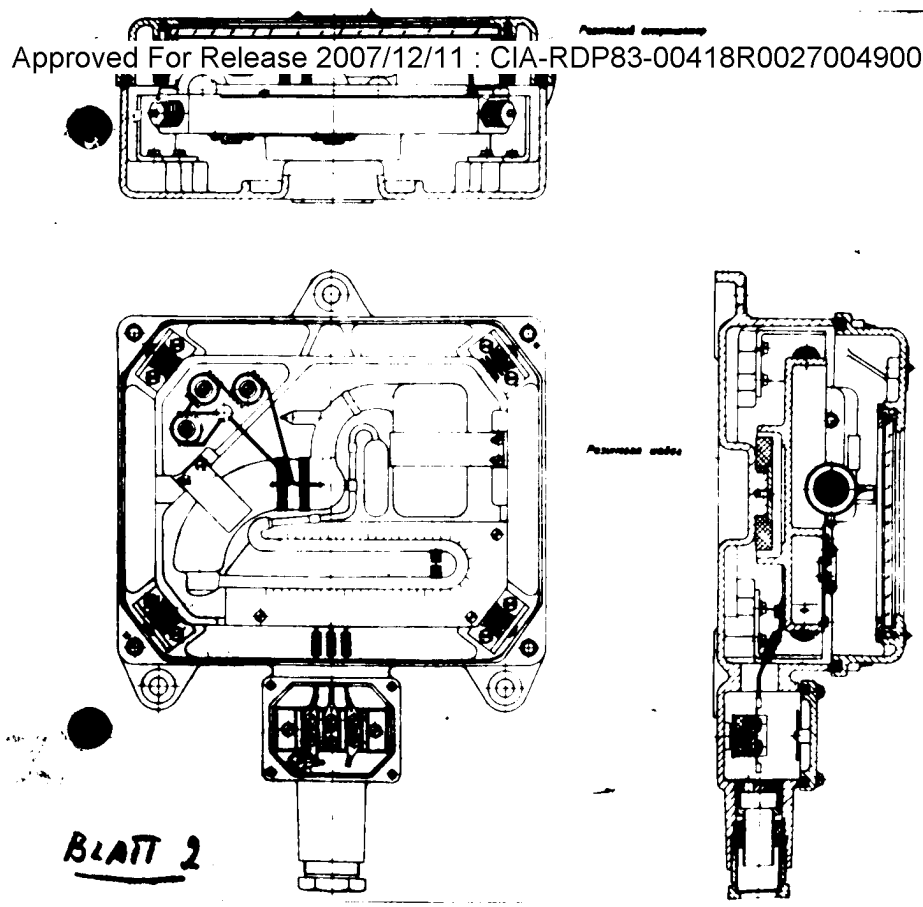

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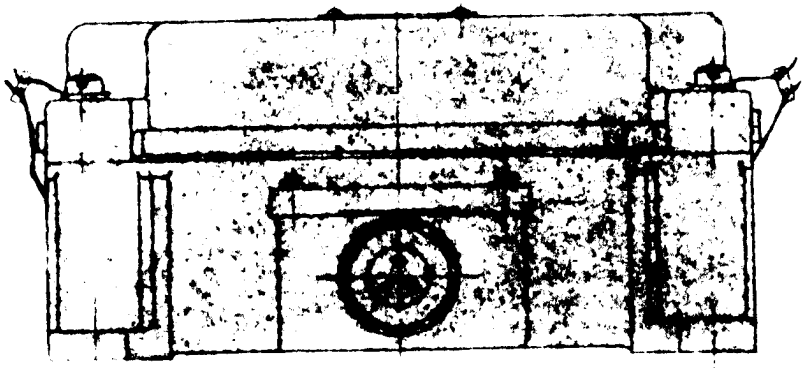

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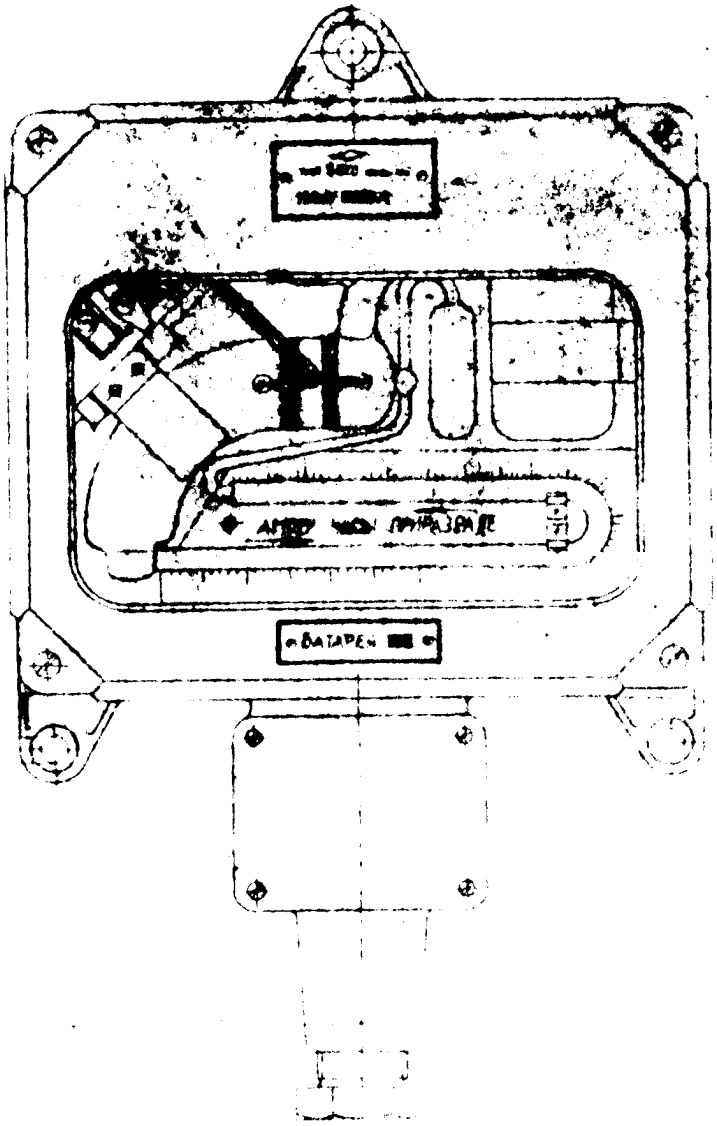

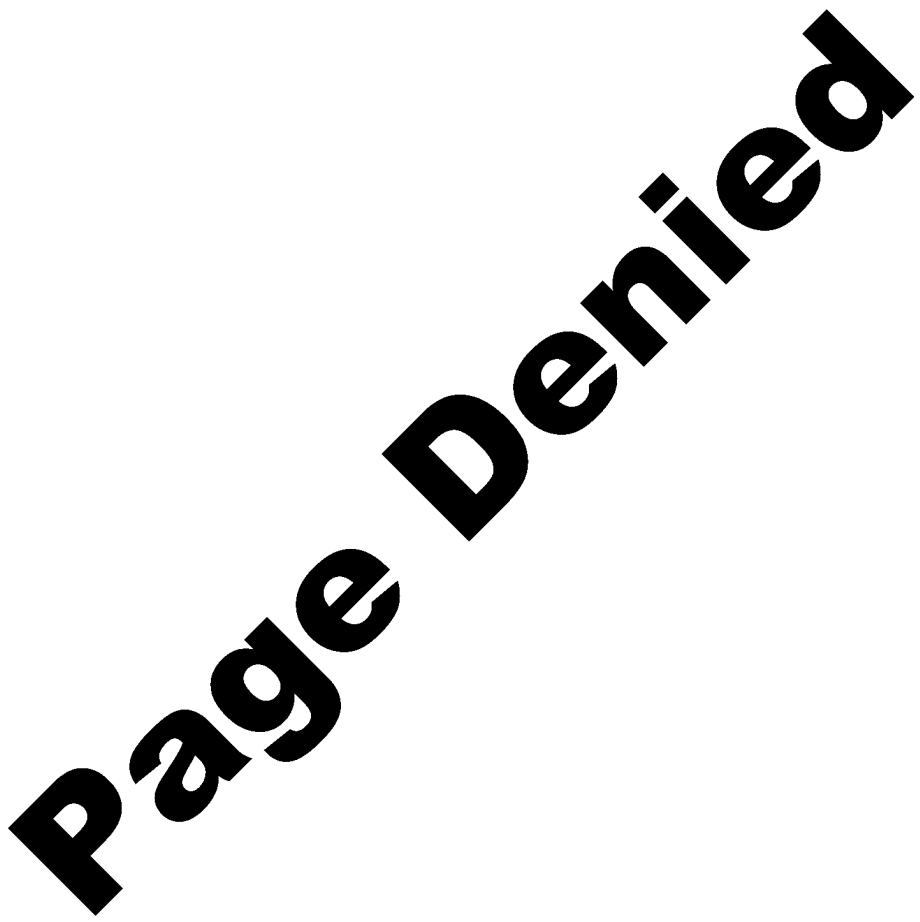

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